

Number patterns are **often** formed through the use of a mathematical rule. Once the rule has been realized, then other numbers in the pattern or sequence can be determined. Sometimes, the rule is multiplication, division, addition or subtraction or a combination of operations. Other times, the sequence is formed because of the **type of number** it is (triangular, square, cube, etc). To determine the rule, choose two numbers and determine how you get from one number to another through the use of a mathematical operation. If a mathematical rule doesn't seem to apply, it might just be a special type of number.

Finding the next number in the sequence:

Eg. 13, 18, 23, 28, 33 (Add 5 to each number)

Eg. 4, 8, 16, 32, 64 (Multiply each number by 2)

Eg. 88, 44, 22, 11, 5.5 (Divide each number by 2)

Recognizing types of numbers:

Eg. 3, 5, 7, 9, 11, 13 (Odd numbers)

Eg. 8, 10, 12, 14, 16, 18 (Even numbers)

Eg. 3, 6, 10, 15, 21 (Triangular numbers)

1. What **mathematical operation** is applied to each sequence below to arrive at the patterns shown:

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|------------------------|---------------------------|---------------------------|
| a) 7, 5, 3, 1 _____ | b) 3, 11, 19, 27 _____ | c) 40, 20, 10, 5 _____ |
| d) 1, 11, 21, 31 _____ | e) 1, 10, 100, 1000 _____ | f) 90, 30, 10, 3.33 _____ |
| g) 2, 6, 18, 54 _____ | h) 62, 59, 56, 53 _____ | i) 2, 4, 16, 256 _____ |

2. What special **types of numbers/sequence** are/is shown in each sequence below to arrive at the pattern:

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|---------------------------------|---------------------------------------|
| a) _____ 0, 1, 3, 6, 10, 15... | b) _____ 64, 81, 100, 121, 144... |
| c) _____ 25, 27, 29, 31, 33... | d) _____ 2, 3, 5, 7, 9, 11, 13, 17... |
| e) _____ 1, 4, 9, 16, 25, 36... | f) _____ -3, -2, -1, 0, 1, 2, 3... |
| g) _____ 62, 64, 66, 68, 70... | h) _____ 31, 37, 41, 43, 47... |
| i) _____ 1, 8, 27, 64, 125... | j) _____ 1, 1, 2, 3, 5, 8, 13... |

3. Write the next two numbers in the patterns below and write the rule used to generate each sequence.

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|------------------------------------|--------------|-------|
| a) 0, 3, 6, 9, 12 | _____, _____ | _____ |
| b) 91, 87, 83, 79 | _____, _____ | _____ |
| c) 1, 3, 9, 27, 81 | _____, _____ | _____ |
| d) 1, 4, 9, 16, 25 | _____, _____ | _____ |
| e) 128, 64, 32, 16 | _____, _____ | _____ |
| f) 0.1, 1, 10, 100 | _____, _____ | _____ |
| g) 3, 6, 12, 24, 48 | _____, _____ | _____ |
| h) -1, -8, -27, -64 | _____, _____ | _____ |
| i) $\sqrt{10}, \sqrt{9}, \sqrt{8}$ | _____, _____ | _____ |
| j) 2, 7, 5, 10, 8 | _____, _____ | _____ |

4. Look at the following number sequence: 5, 11, 17, 23. The 25th term in the sequence is 149.

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| a) Write down the 26 th term: _____ | b) Write down the 24 th term: _____ |
| c) Will 179 be in the sequence? _____ | d) Find a formula for the sequence: _____ |

5. Look at the following number sequence: 8, 15, 22, 29. The 40th term in the sequence is 281.

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| a) Write down the 41 st term: _____ | b) Write down the 39 th term: _____ |
| c) Will 357 be in the sequence? _____ | d) Find a formula for the sequence: _____ |